Generative AI for Customizable Learning Experiences

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Abstract

The introduction of accessible generative artificial intelligence opens promising opportunities for the implementation of personalized learning methods in any educational environment. Personalized learning has been conceptualized for a long time, but it has only recently become realistic and truly achievable. In this paper, we propose an affordable and sustainable approach toward personalizing learning materials as part of the complete educational process. We have created a tool within a pre-existing learning management system at a software engineering college that automatically generates learning materials based on the learning outcomes provided by the professor for a particular class. The learning materials were composed in three distinct styles, the initial one being the traditional professor style and the other two variations adopting a pop-culture influence, namely Batman and Wednesday Addams. Each lesson, besides being delivered in three different formats, contained automatically generated multiple-choice questions that students could use to check their progress. This paper contains complete instructions for developing such a tool with the help of large language models using OpenAI's API and an analysis of the preliminary experiment of its usage performed with the help of 20 college students studying software engineering at a European university. Participation in the study was optional and on voluntary basis. Each student's tool usage was quantified, and two questionnaires were conducted: one immediately after subject completion and another 6 months later to assess both immediate and long-term effects, perceptions, and preferences. The results indicate that students found the multiple variants of the learning materials really engaging. While predominantly utilizing the traditional variant of the learning materials, they found this approach inspiring, would recommend it to other students, and would like to see it more in classes. The most popular feature were the automatically generated quiz-style tests that they used to assess their understanding. Preliminary evidence suggests that the use of various versions of learning materials leads to an increase in students' study time, especially for students who have not mastered the topic otherwise. The study's small sample size of 20 students restricts its ability to generalize its findings, but its results provide useful early insights and lay the groundwork for future research on AI-supported educational strategies.